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Attention and visuo-spatial function in children aged 6-8 years without cerebral palsy, who were cooled for neonatal encephalopathy; preliminary evidence of dorsal stream vulnerability.

Background: Neonatal encephalopathy (NE) after asphyxia affects 1-3/1000 live births in the UK each year. Therapeutic hypothermia (TH), significantly cooling infants with NE within 6 hours of birth for three days, reportedly improves outcome and reduces incidence of cerebral palsy (CP) in survivors. As such it is now standard-care for infants with NE. Previous research attests to the vulnerability of the dorsal cortical stream of the visual system in perinatal brain injury. Measures of visuo-spatial ability, and control of attention are reportedly indicators of the integrity of the dorsal cortical stream (Atkinson & Braddick, 2010). Children aged 6-7 years who underwent TH for NE are reported to have cognitive impairments even in the absence of cerebral palsy (CP) (Pappas et al, 2015). It is unknown whether visuospatial and attention abilities are affected in early school age children cooled for NE that do not have CP.
Objective: In children aged around 6-to-8 years without CP who were cooled for NE we (i) compared visuospatial and attention abilities with a contemporary control group, and (ii) investigated the relation between attention abilities and cognitive function.
Design/Methods: Twenty-seven children aged 6-8 years cooled for NE, and 18 controls matched for age, sex and socio-economic status were administered an attention test (the Connor's Performance Test-2) utilizing measures of average speed of correct responses, response speed consistency, and change in reaction time across test-duration. The block construction test from the NEPSY-II was used as a measure of visuo-spatial processing. The WISC-IV-UK was used to generate Full-scale IQ data. We assessed the relation between response times <50th percentile on Full scale IQ (FSIQ<85).
Results: In considering attention, children with NE were found to have significantly reduced abilities in sustaining attention over time, their reaction-times were slower and there was greater inconsistency in response speed compared to controls. They were also found to have significantly reduced visuo-spatial processing performance. Response times <50th percentile were found to have 100% specificity and positive predictive value in predicting FSIQ<85.
Conclusions: Our results provide preliminary evidence to support dorsal stream vulnerability in children with NE after cooling, and further indicate that difficulties with attention and visuo-spatial processing may contribute to cognitive impairments in cooled children without CP. We discuss negative early neuro-cognitive effects as potentially predictive of later executive function difficulties.

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